

2006 Buick Lucerne CXS

2006 SUSPENSION Front Suspension - Lucerne

2006 SUSPENSION**Front Suspension - Lucerne****SPECIFICATIONS****FASTENER TIGHTENING SPECIFICATIONS****Fastener Tightening Specifications**

Application	Specification	
	Metric	English
Ball Joint Nut		
• First Pass	30 N.m	22 lb ft
• Second Pass	Plus 210 Degrees	
Ball Stud	12 N.m	106 lb in
Brake Line Bracket	23 N.m	17 lb ft
Front Insulator Bolts	195 N.m	144 lb ft
Front Lower Control Arm Bolt	157 N.m	116 lb ft
Front Lower Control Arm Nut	150 N.m	111 lb ft
Hub Bearing Bolts	130 N.m	96 lb ft
Rear Lower Control Arm Bolts	146 N.m	108 lb ft
Stabilizer Shaft Bracket Bolts	50 N.m	37 lb ft
Stabilizer Shaft Link Nut	23 N.m	17 lb ft
Strut to Knuckle Nuts	177 N.m	131 lb ft
Strut Mount Nut	50 N.m	37 lb ft
Strut Tower Bolts	60 N.m	44 lb ft
Tie Rod Nut		
• First Pass	30 N.m	22 lb ft
• Second Pass	Plus 200 Degrees	
Wheel Drive Shaft Axle Nut	160 N.m	118 lb ft
Wheel Nut	125 N.m	80 lb ft

REPAIR INSTRUCTIONS**STABILIZER SHAFT REPLACEMENT****Tools Required****J 24319-B** Universal Steering Linkage Puller**Removal Procedure**

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the front tires and wheels. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the stabilizer shaft links. Refer to **Stabilizer Shaft Link Replacement**.
4. Remove the stabilizer shaft insulators. Refer to **Stabilizer Shaft Insulator Replacement**.

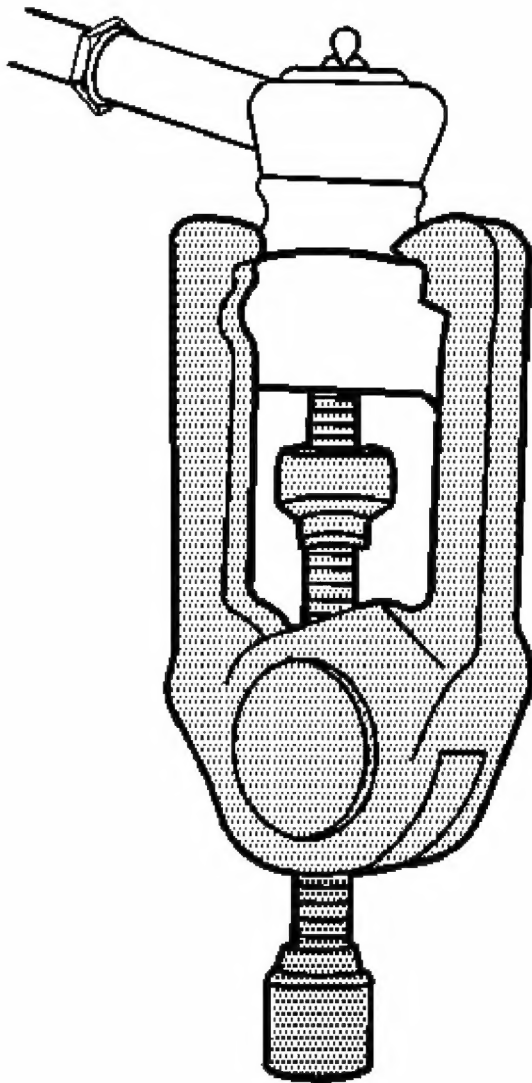


Fig. 1: Removing Outer Tie Rod Assembly From Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

5. Remove the left outer tie rod retaining nut.
6. Use the **J 24319-B** in order to remove the left tie rod end (1) from the steering knuckle (2).
7. Remove the exhaust manifold pipe. Refer to **Exhaust Manifold Rear Pipe Replacement (RPO LD8)** .
8. Turn the left strut completely to the left. Guide the stabilizer shaft out the left side of the vehicle between the body and the strut.

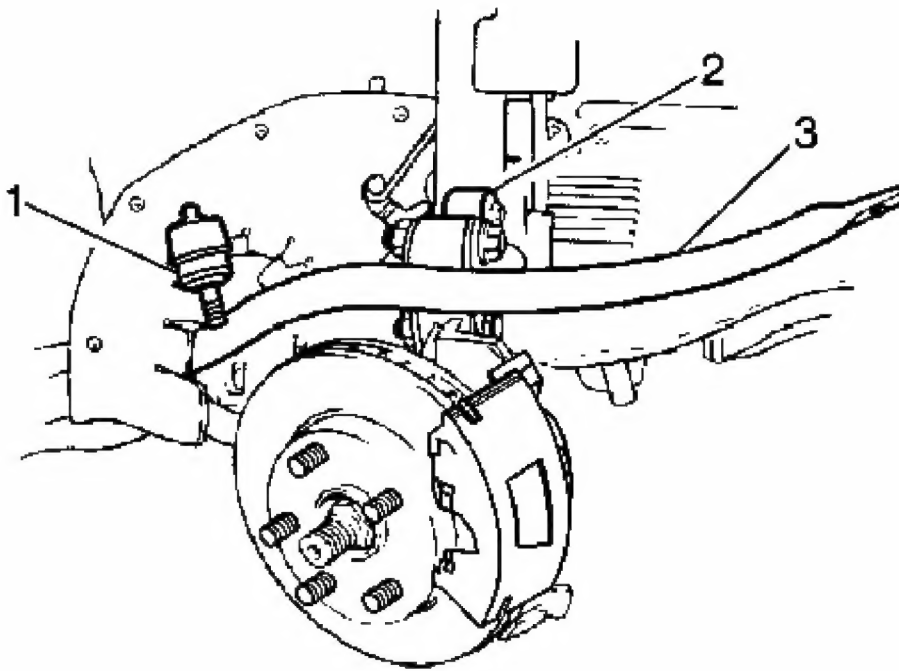


Fig. 2: Guiding Stabilizer Shaft In/Out Left Side Of Vehicle
Courtesy of GENERAL MOTORS CORP.

9. Remove the stabilizer shaft (3) from the vehicle.

Installation Procedure

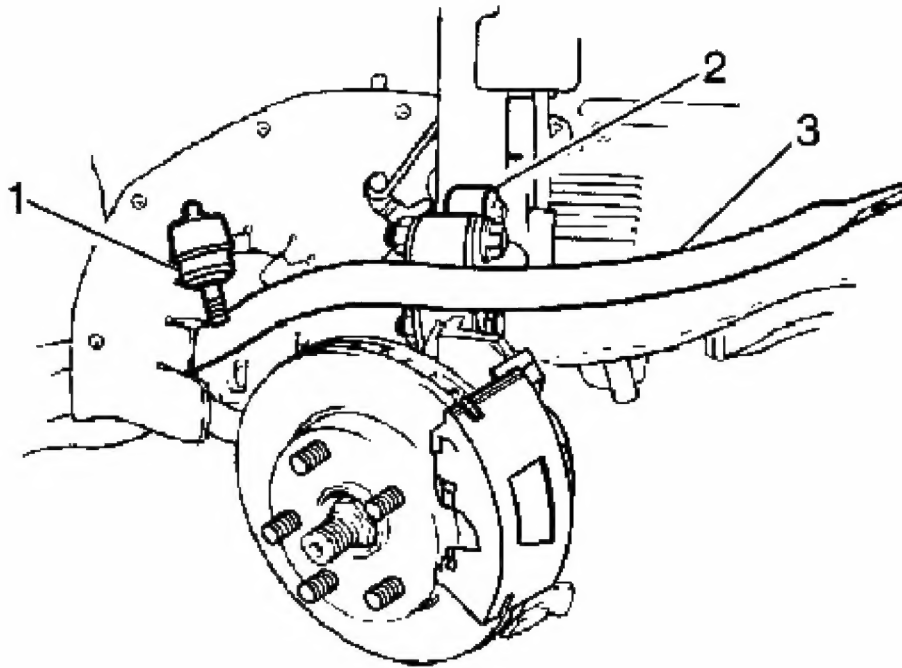


Fig. 3: Guiding Stabilizer Shaft In/Out Left Side Of Vehicle
Courtesy of GENERAL MOTORS CORP.

1. Install the stabilizer shaft (3) to the vehicle.
2. Install the exhaust manifold pipe. Refer to **Exhaust Manifold Rear Pipe Replacement (RPO LD8)** .

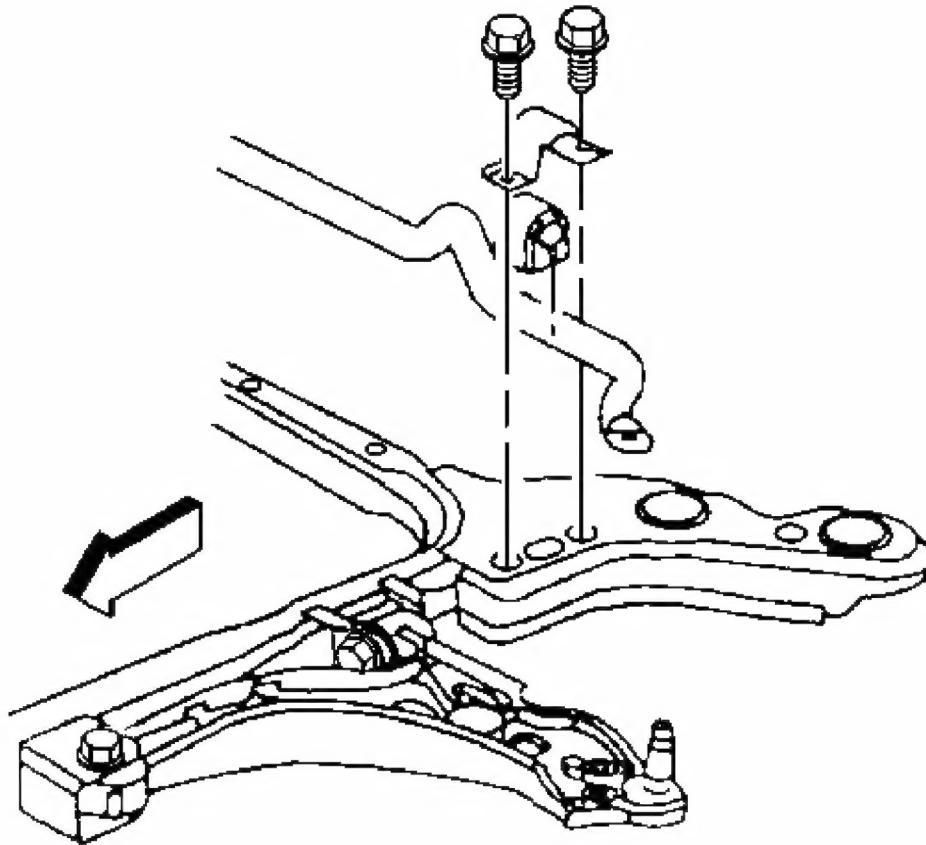


Fig. 4: Removing/Installing Stabilizer Shaft Insulator
Courtesy of GENERAL MOTORS CORP.

3. Loosely install the following components:
 1. The left and right stabilizer shaft insulators
 2. The stabilizer shaft insulator brackets
 3. The stabilizer shaft bracket bolts
4. Install the stabilizer shaft links. Refer to **Stabilizer Shaft Link Replacement**.

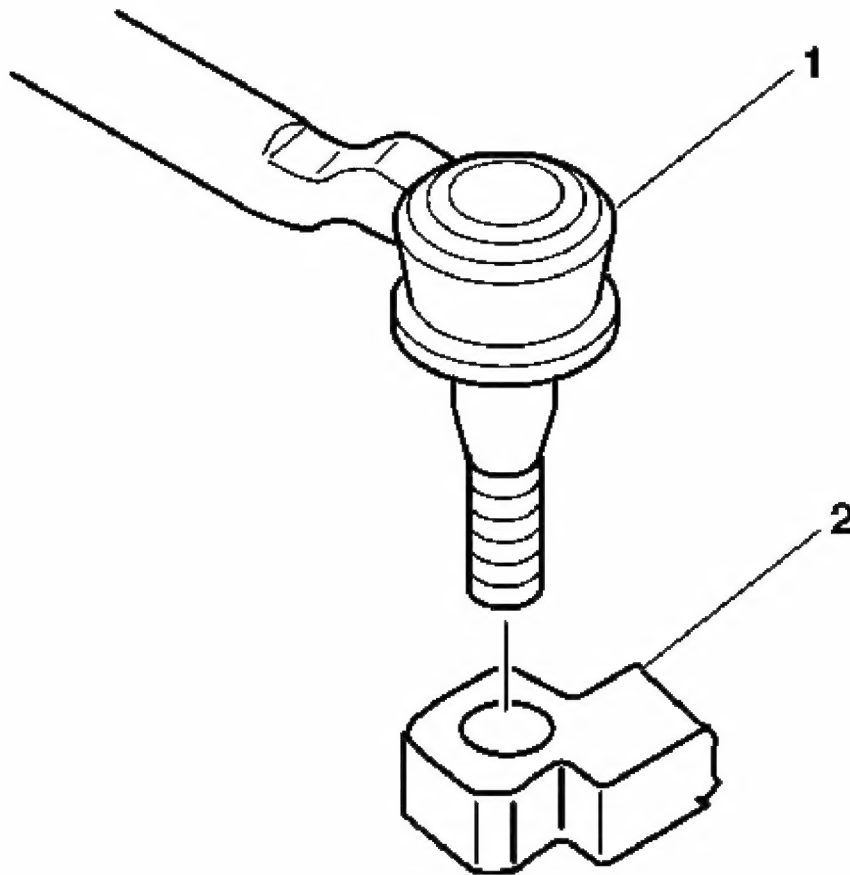


Fig. 5: Installing Right Outer Tie Rod To Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

5. Install the left tie rod end (1) to the steering knuckle.

NOTE: Refer to FUEL TANK STRAP FASTENER NOTICE .

6. Tighten the following components.

Tighten:

- Tighten the stabilizer shaft insulator bracket bolts to 50 N.m (37 lb ft).
- Tighten the outer tie rod end to steering knuckle retaining nut to 30 N.m (22 lb ft) plus an additional 200 degrees.

7. Install the front tires and wheels. Refer to Tire and Wheel Removal and Installation .

8. Lower the vehicle.

STABILIZER SHAFT LINK REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the front wheels and tires. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the stabilizer shaft link bolt.

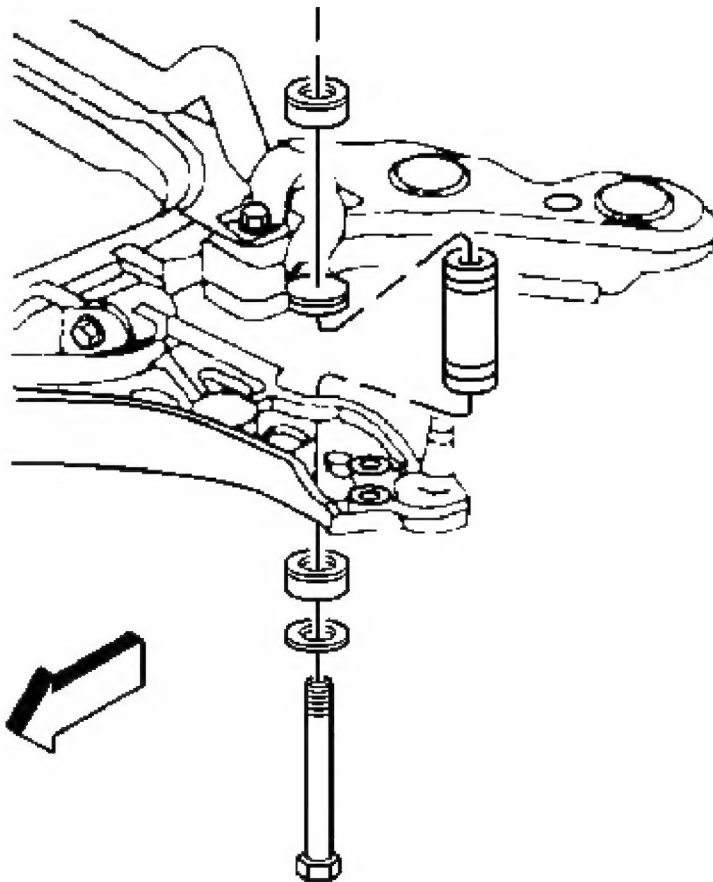


Fig. 6: Removing/Installing Stabilizer Shaft Link Bolt
Courtesy of GENERAL MOTORS CORP.

4. Remove the stabilizer shaft insulators and spacers.

Installation Procedure

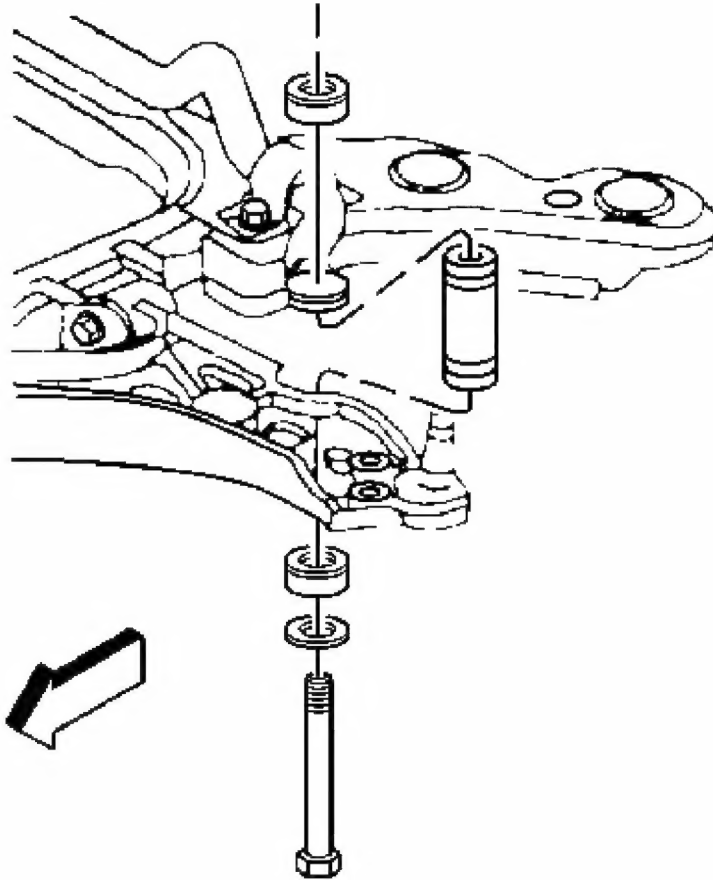


Fig. 7: Removing/Installing Stabilizer Shaft Link Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to FUEL TANK STRAP FASTENER NOTICE .

1. Loosely install the stabilizer link components.

Tighten: Tighten the stabilizer link nuts to 17 N.m (13 lb ft).

2. Install the front wheels and tires. Refer to Tire and Wheel Removal and Installation .
3. Lower the vehicle.

STABILIZER SHAFT INSULATOR REPLACEMENT

Removal Procedure

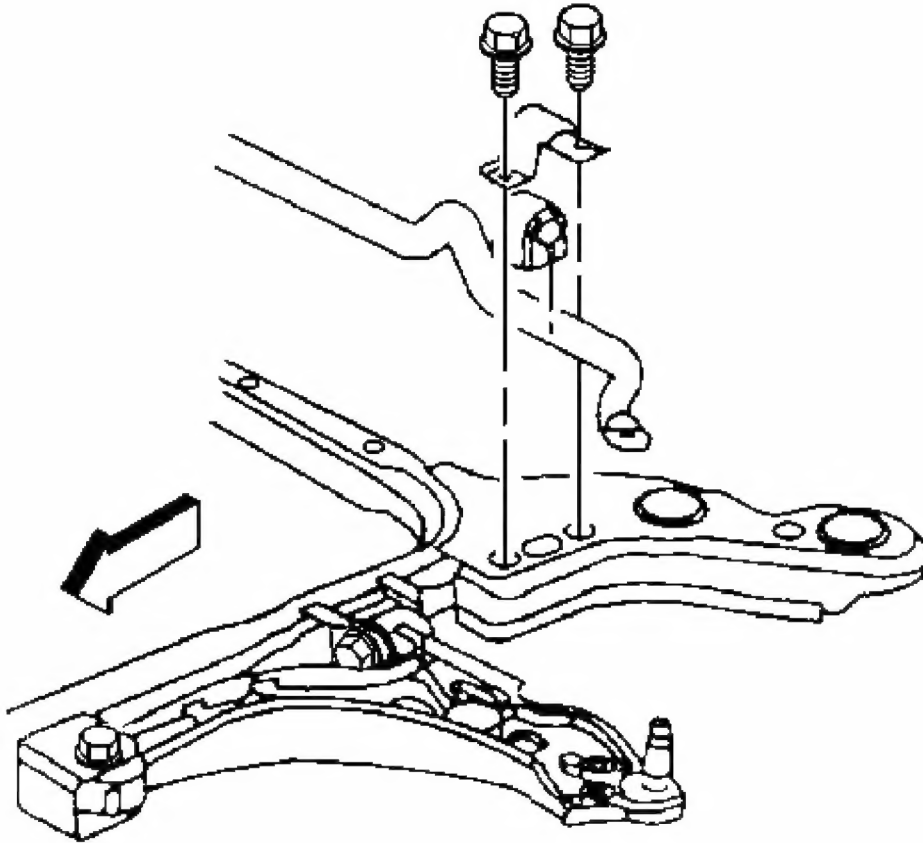


Fig. 8: Removing/Installing Stabilizer Shaft Insulator
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the stabilizer shaft bracket bolts.
3. Remove the stabilizer shaft bracket.
4. Using a pry bar, lift upwards on the stabilizer shaft and remove the stabilizer shaft insulator.

Installation Procedure

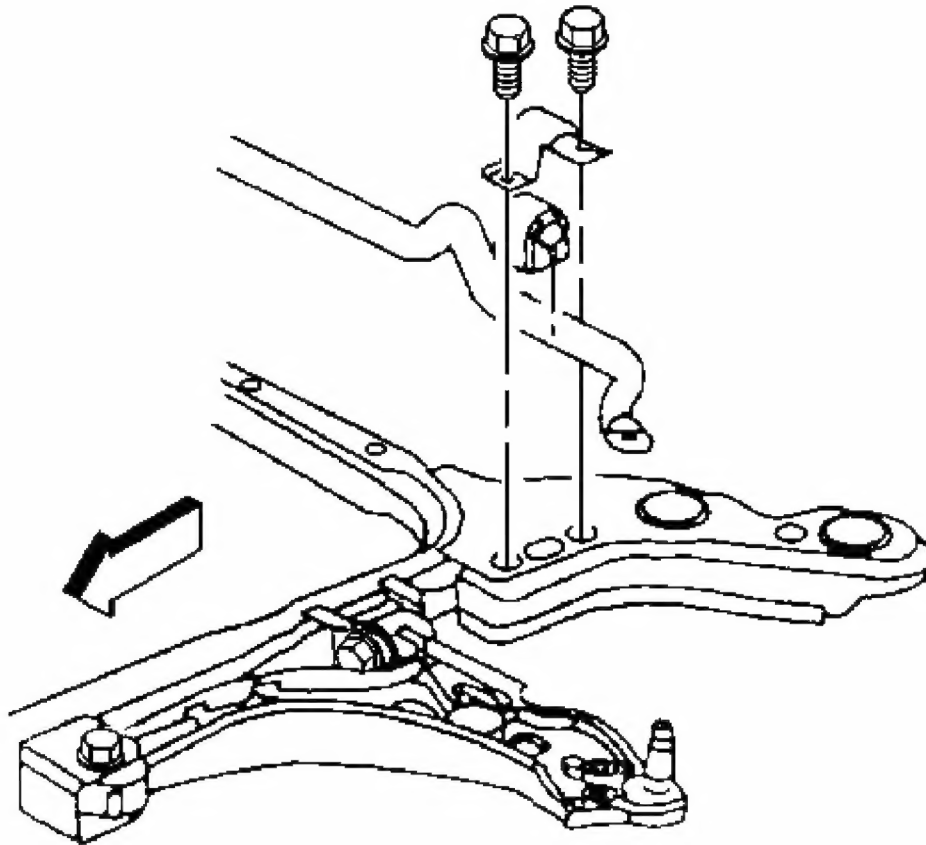


Fig. 9: Removing/Installing Stabilizer Shaft Insulator
Courtesy of GENERAL MOTORS CORP.

1. Using a pry bar, lift up on the stabilizer shaft and install the stabilizer shaft insulator.
2. Install the stabilizer shaft bracket.

NOTE: Refer to FUEL TANK STRAP FASTENER NOTICE .

3. Install the stabilizer shaft bracket bolts.

Tighten: Tighten the stabilizer shaft bracket bolts to 50 N.m (37 lb ft).

4. Lower the vehicle.

LOWER CONTROL ARM BALL JOINT REPLACEMENT

The lower ball joint is serviced as part of the lower control arm. Refer to **Lower Control Arm Replacement**.

FRONT WHEEL BEARING AND HUB REPLACEMENT

Tools Required

J 28733-B Front Hub Spindle Remover

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
3. Clean the drive axle threads of all dirt.

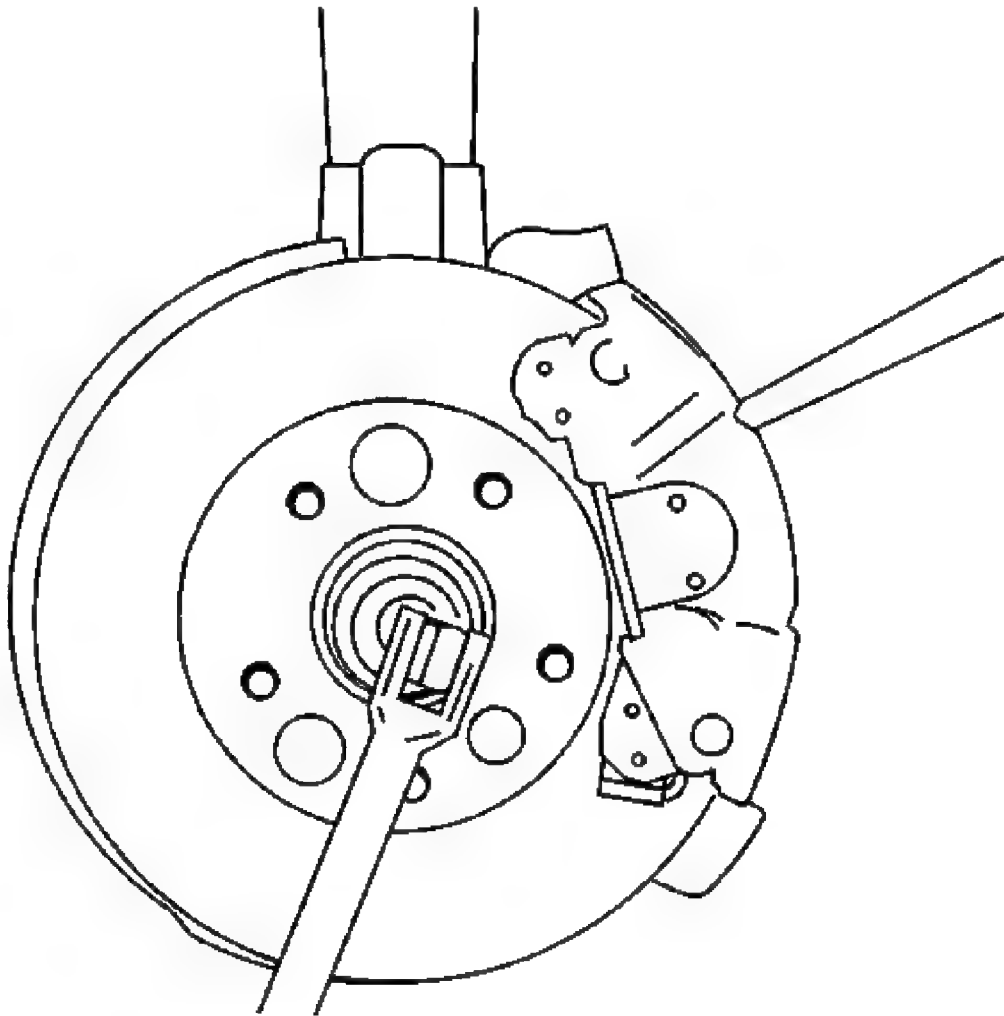


Fig. 10: Using Drift To Prevent Rotor Rotation
Courtesy of GENERAL MOTORS CORP.

4. Insert a drift punch or a screwdriver into the caliper and the rotor in order to prevent the rotor from turning.
5. Remove the drive axle nut.
6. Remove the brake rotor. Refer to **Front Brake Rotor Replacement** .

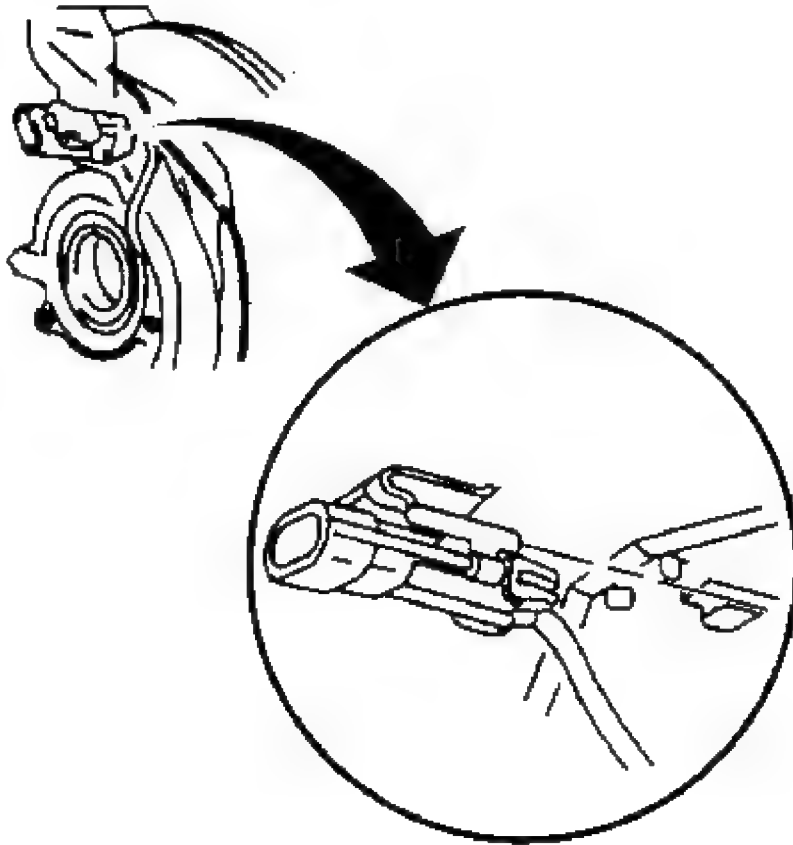


Fig. 11: Disconnecting/Reconnecting ABS Front Wheel Speed Sensor
Courtesy of GENERAL MOTORS CORP.

7. Disconnect the antilock brake system (ABS) front wheel speed sensor connector. Unclip the connector from the dust shield.

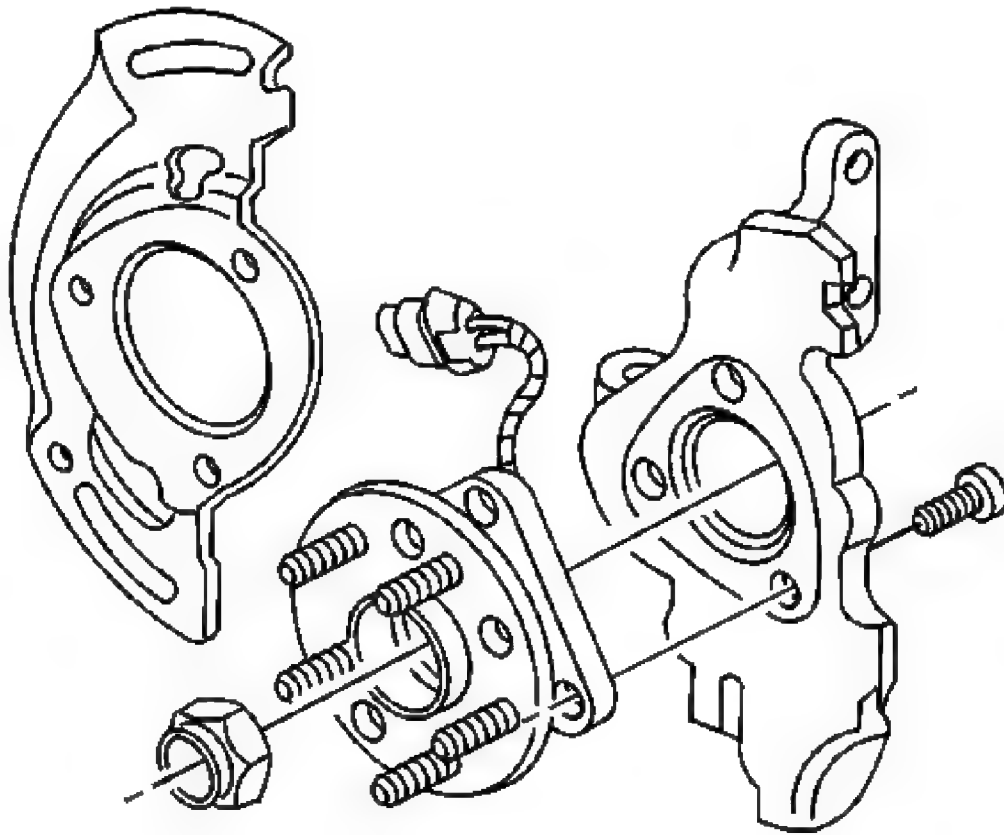


Fig. 12: Removing/Installing Wheel Bearing/Hub Retaining Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the wheel bearing/hub retaining bolts.

IMPORTANT: Replace the hub and bearing only as an assembly.

9. Remove the wheel bearing/hub from the steering knuckle.
10. Remove the dust shield.
11. Use the **J 28733-B** in order to separate the hub and bearing from the drive axle.
12. Clean the rust and the foreign material from the following components in order to allow proper seating of the bearing into the knuckle:
 - The knuckle mounting face
 - The bore
 - The chamber

Installation Procedure

1. Remove the protective plastic cover before installation. Do not handle the knuckle or hub assembly by the ABS sensor wire.
2. Carefully install the dust shield. Do not damage the bearing outboard lip seal or the hub and bearing bolts.
3. Apply a thin layer of grease to the steering knuckle bore.
4. Install the wheel bearing/hub and dust shield to the steering knuckle.

NOTE: Refer to Fastener Notice .

5. Install the wheel bearing/hub retaining bolts.

Tighten: Tighten the wheel bearing/hub retaining bolts to 130 N.m (96 lb ft).

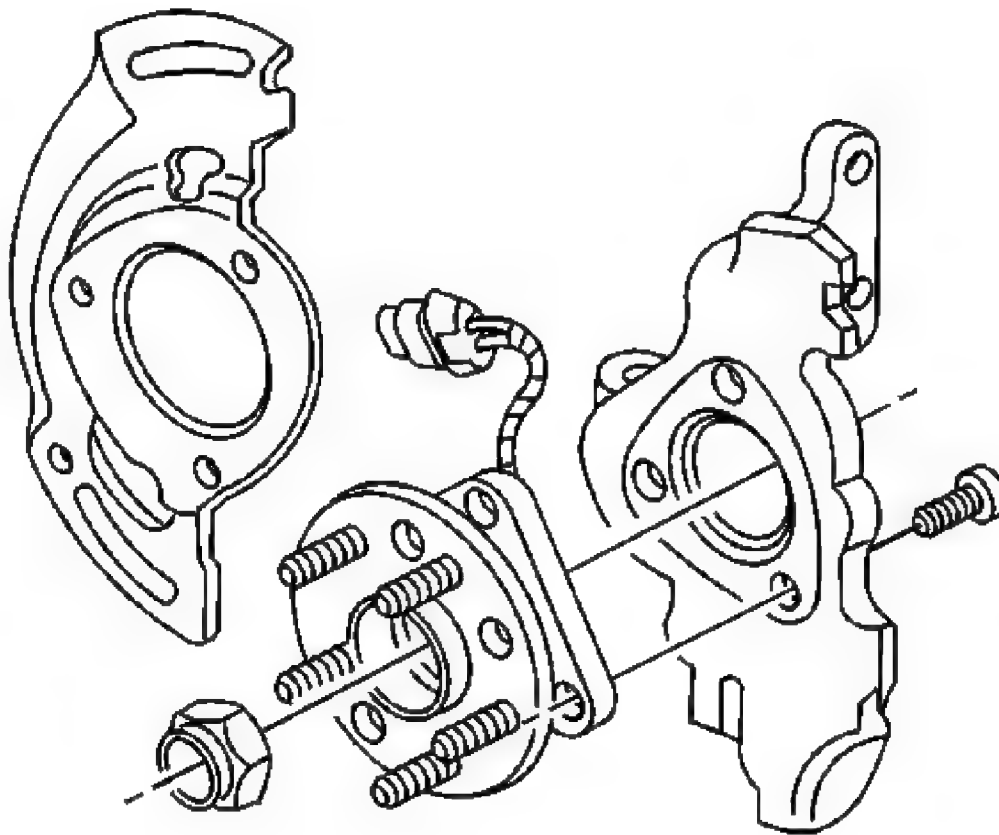


Fig. 13: Removing/Installing Wheel Bearing/Hub Retaining Bolts
Courtesy of GENERAL MOTORS CORP.

6. Install the new drive axle nut, draw wheel bearing/hub onto the axle.

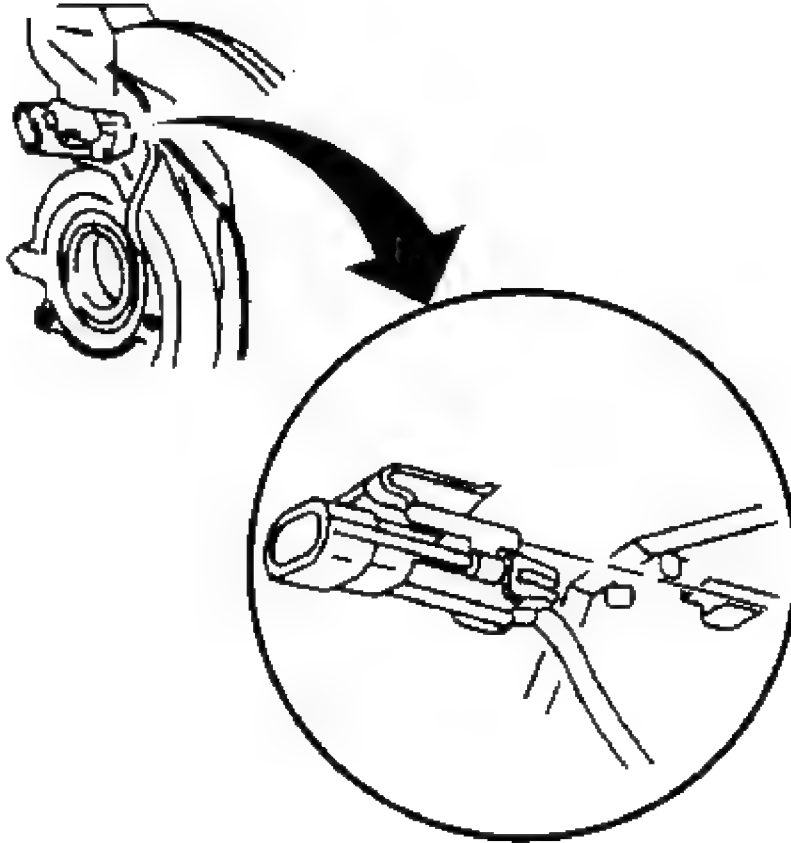


Fig. 14: Disconnecting/Reconnecting ABS Front Wheel Speed Sensor
Courtesy of GENERAL MOTORS CORP.

7. Connect the ABS front wheel speed sensor connector. Clip the connector to the dust shield.
8. Install the brake rotor. Refer to **Front Brake Rotor Replacement** .

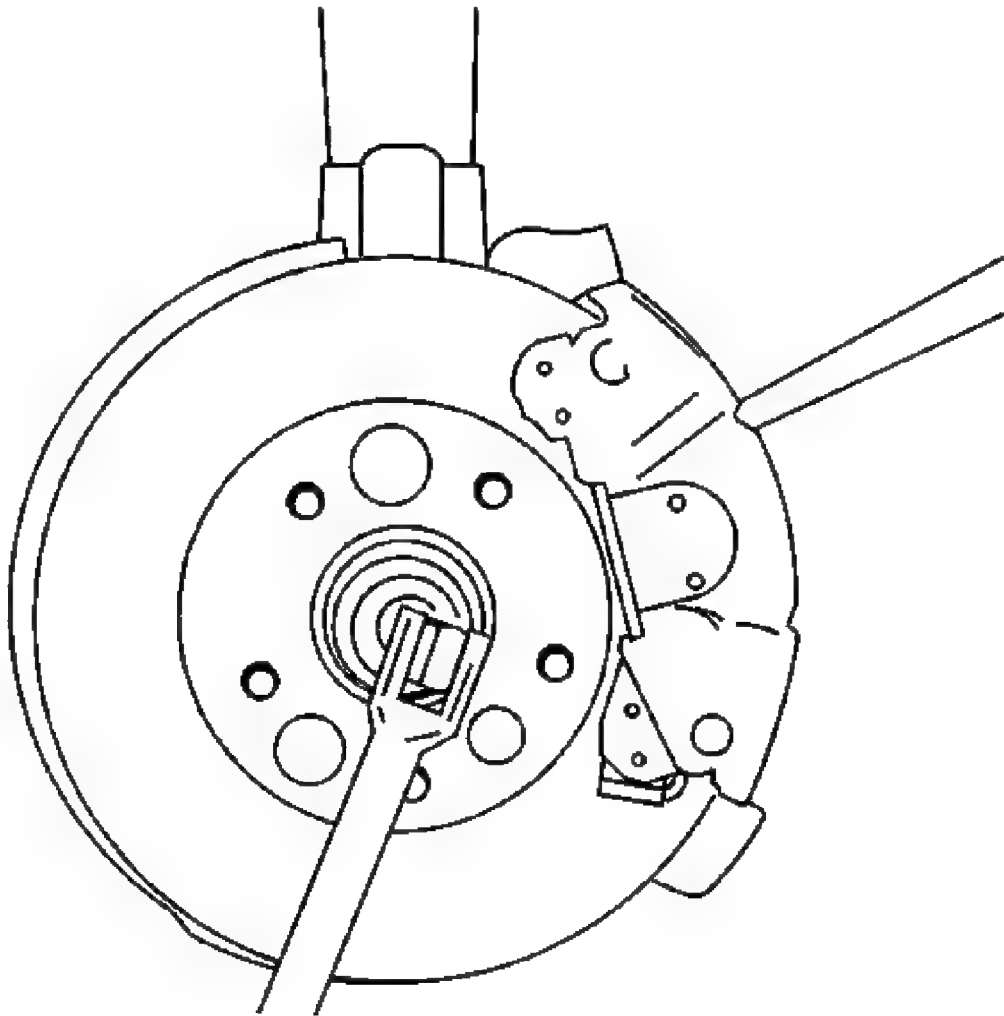


Fig. 15: Using Drift To Prevent Rotor Rotation
Courtesy of GENERAL MOTORS CORP.

9. Insert a drift punch or a screwdriver into the caliper and rotor in order to prevent the rotor from turning.

Tighten: Tighten the drive axle nut to 160 N.m (118 lb ft).

10. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
11. Lower the vehicle.

STEERING KNUCKLE REPLACEMENT

Fig. 16: Identifying Steering Knuckle (FE1, FE3)
Courtesy of GENERAL MOTORS CORP.

Steering Knuckle Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Tools Required <ul style="list-style-type: none">• J 24319-B Steering Linkage and Tie Rod Puller• J 39549 Ball Joint and Tie Rod End Separator. See <u>Special Tools</u>.	
Preliminary Procedures <ol style="list-style-type: none">1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .2. Remove the front tire and wheel assembly. Refer to <u>Tire and Wheel Removal and Installation</u> .3. Remove the brake rotor from the wheel hub/bearing. Refer to <u>Front Brake Rotor Replacement</u> .	

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4. Remove the wheel bearing/hub. Refer to **Front Wheel Bearing and Hub Replacement**.

1	Outer Tie Rod End Nut Tip: <ul style="list-style-type: none">• Use the J 24319-B to separate the tie rod end from the steering knuckle.• Always replace the tie rod end nut after it has been used. Tighten: 30 N.m (22 lb ft) plus an additional 200 degrees
2	Outer Tie Rod End
3	Strut to Steering Knuckle Nut (Qty: 2) Tighten: 177 N.m (131 lb ft)
4	Strut to Steering Knuckle Bolt (Qty: 2)
5	Lower Ball Joint Nut Tip: <ul style="list-style-type: none">• Use the J 39549 to separate the ball joint from the lower control arm. See <u>Special Tools</u>.• Always replace the ball joint nut after it has been used. Tighten: 30 N.m (22 lb ft) plus an additional 210 degrees
6	Steering Knuckle Tip: Remove the steering knuckle from the vehicle.

LOWER CONTROL ARM REPLACEMENT

Fig. 17: Removing/Installing Lower Control Arm
Courtesy of GENERAL MOTORS CORP.

Lower Control Arm Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
<ol style="list-style-type: none">1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .2. Remove the front tire and wheel assembly. Refer to <u>Tire and Wheel Removal and Installation</u> .3. Remove the front stabilizer shaft link. Refer to <u>Stabilizer Shaft Link Replacement</u>.	
	Front Lower Ball Joint Nut

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1	<p>Tip:</p> <ul style="list-style-type: none">• Use the J 39549 Ball Joint Separator, to separate the ball joint from the control arm. See Special Tools.• Always replace the ball joint nut after it has been used. <p>Tighten: 30 N.m (22 lb ft) plus an additional 210 degrees</p>
2	<p>Front Control Arm Front Nut (Qty: 2)</p> <p>Tighten: 150 N.m (111 lb ft)</p>
3	<p>Front Control Arm Front Bolt (Qty: 2)</p> <p>Tip: Remove the bolts from the control arm bracket.</p>
4	<p>Front Control Arm Rear Nut</p> <p>Tip: Do not tighten the control arm nut until the weight of the vehicle is supported by the control arm. The vehicle needs to be sitting at normal trim height.</p> <p>Tighten: 157 N.m (116 lb ft)</p>
5	<p>Front Control Arm Rear Bolt</p> <p>Tip: Remove the bolt from the control arm.</p>
6	<p>Front Control Arm</p> <p>Tip: Remove the control arm from the vehicle.</p>

WHEEL STUD REPLACEMENT

Tools Required

J 43631 Ball Joint Remover. See **Special Tools**.

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the brake rotor. Refer to **Front Brake Rotor Replacement** .

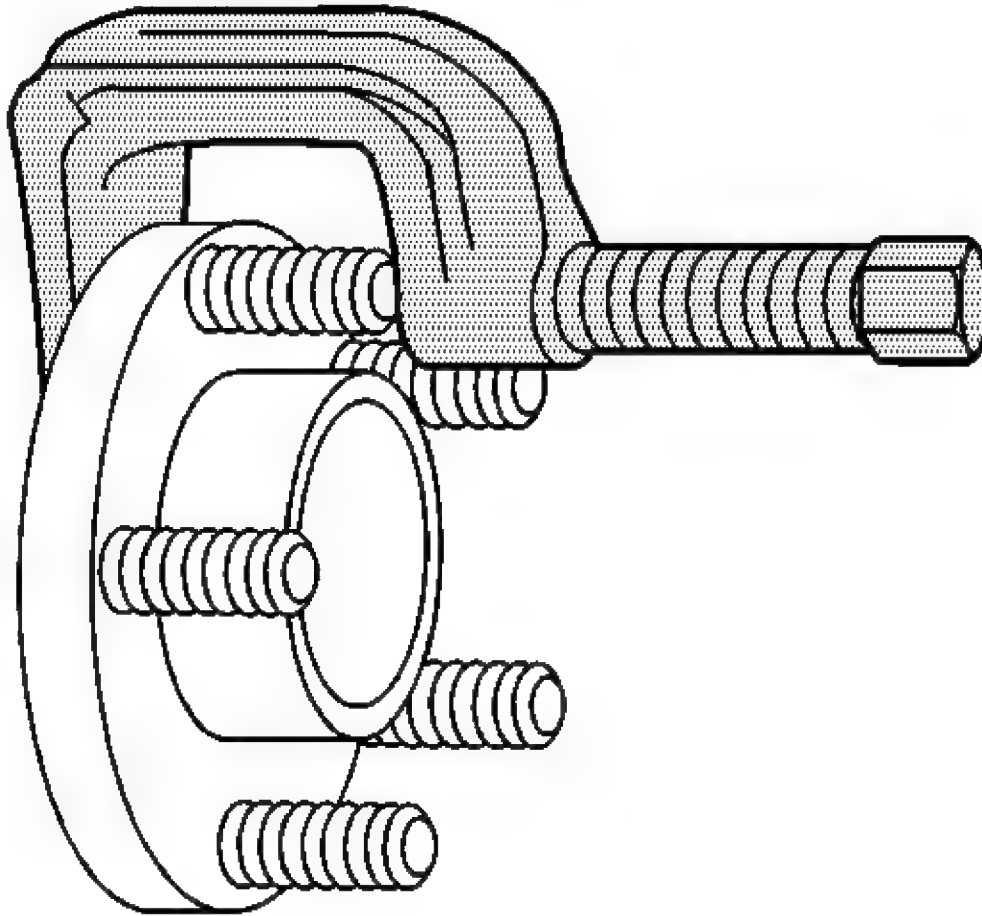


Fig. 18: Removing Wheel Stud From Axle Flange
Courtesy of GENERAL MOTORS CORP.

4. Using **J 43631** press the stud from the wheel bearing/hub. See **Special Tools**.

Installation Procedure

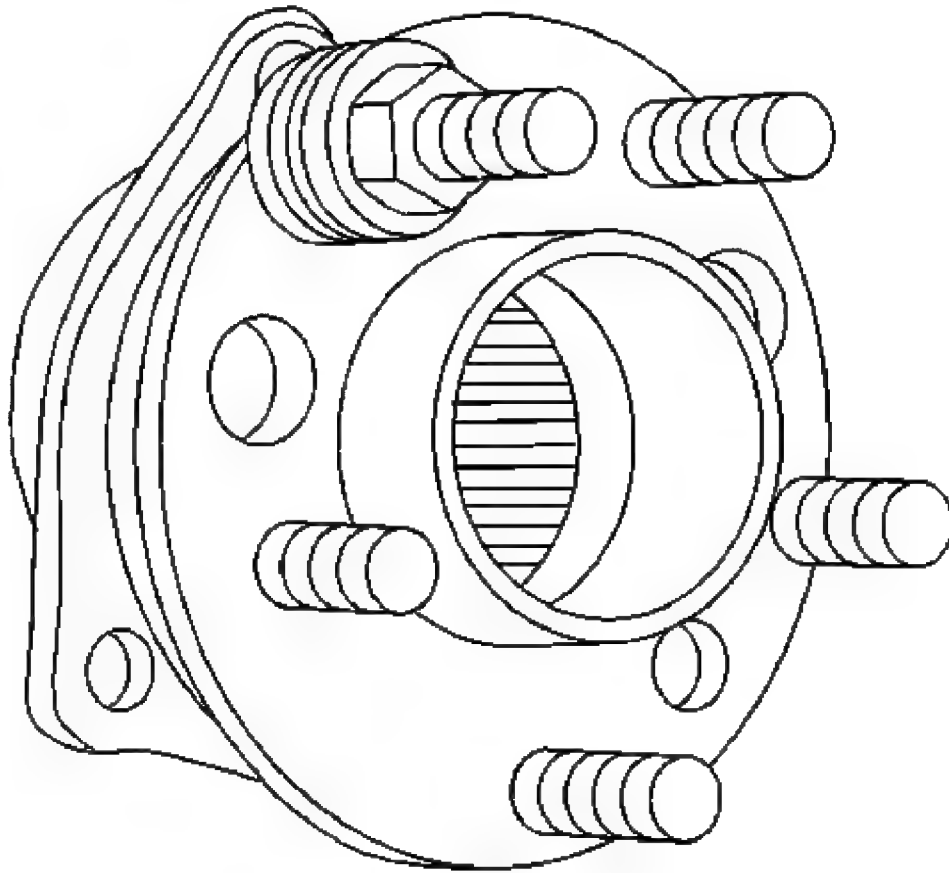


Fig. 19: Installing Wheel Stud
Courtesy of GENERAL MOTORS CORP.

1. Install a new stud. Use washers and a wheel nut and pull the new stud into the hub.
2. Install the brake rotor. Refer to **Front Brake Rotor Replacement** .
3. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
4. Lower the vehicle.

STRUT ASSEMBLY REPLACEMENT

Removal Procedure

NOTE: Use care when handling the coil springs in order to avoid chipping or scratching the coating. Damage to the coating will result in premature failure of the coil springs.

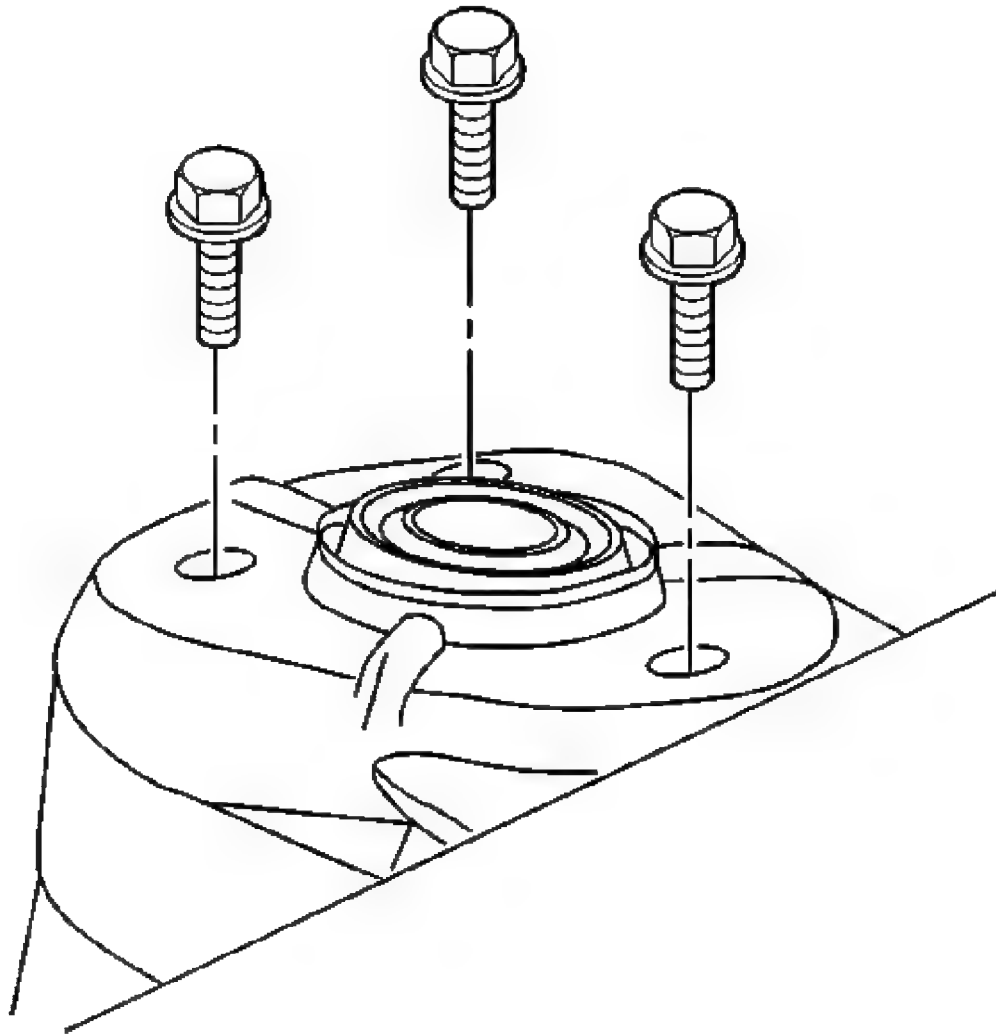


Fig. 20: Removing Strut Mount Retaining Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the strut mount retaining bolts.
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .

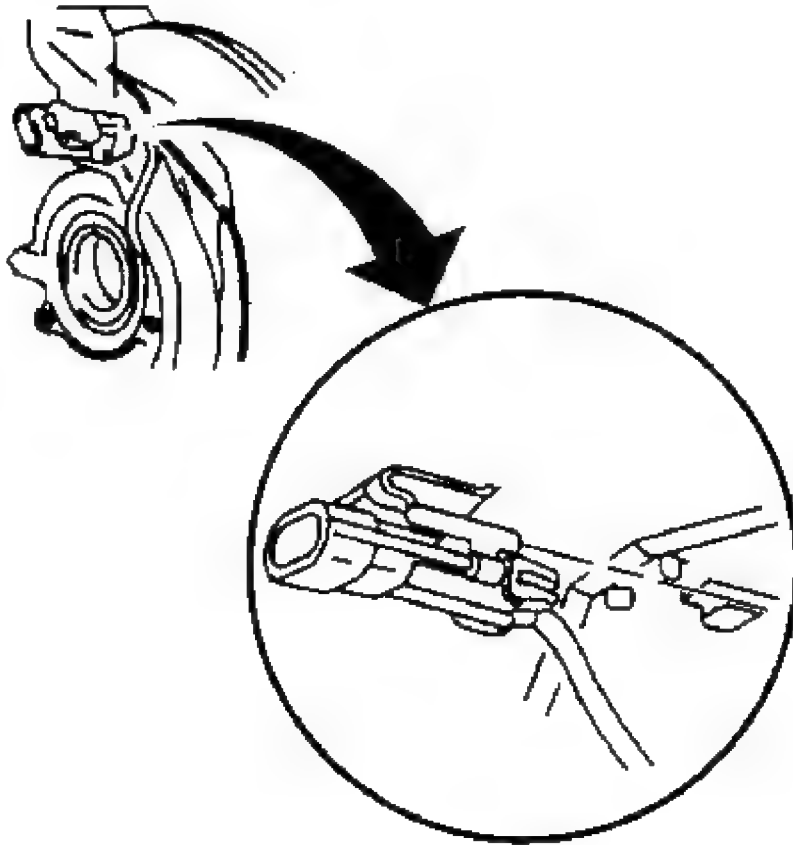


Fig. 21: Disconnecting/Reconnecting ABS Front Wheel Speed Sensor
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the ABS front wheel speed sensor harness connector.
5. If applicable, remove the speed sensor bracket from the strut.

NOTE: The knuckle must be retained after the strut-to-knuckle bolts have been removed. Failure to observe this may cause ball joint and/or wheel drive shaft damage.

6. Remove the brake line bracket from the strut on the left side.

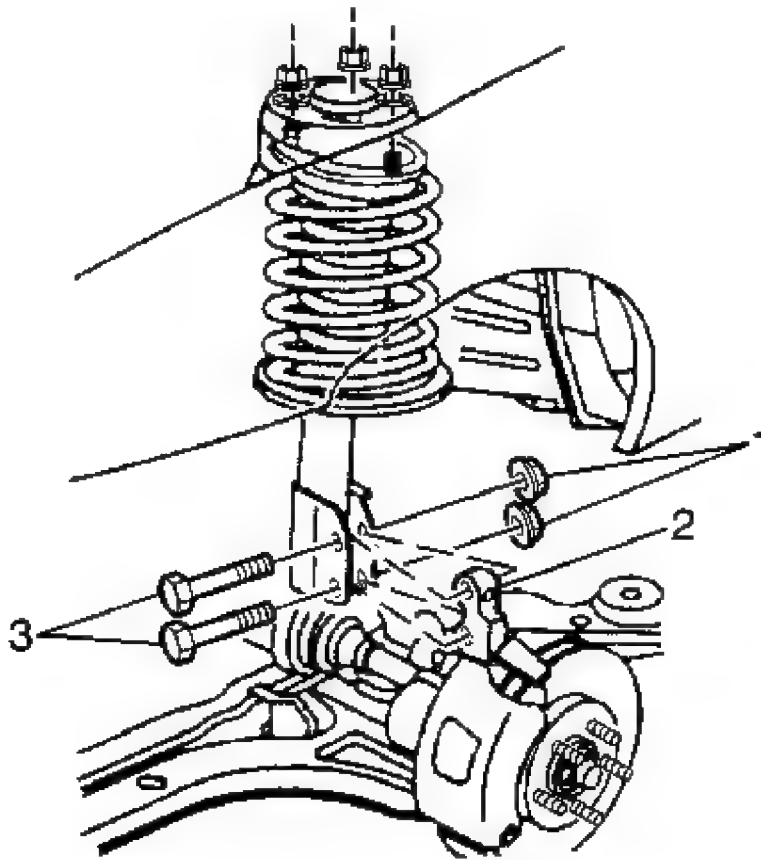


Fig. 22: Removing/Installing Strut
Courtesy of GENERAL MOTORS CORP.

7. Remove the strut to knuckle bolts (3) and the nuts (1).
8. Remove the strut from the vehicle.

Installation Procedure

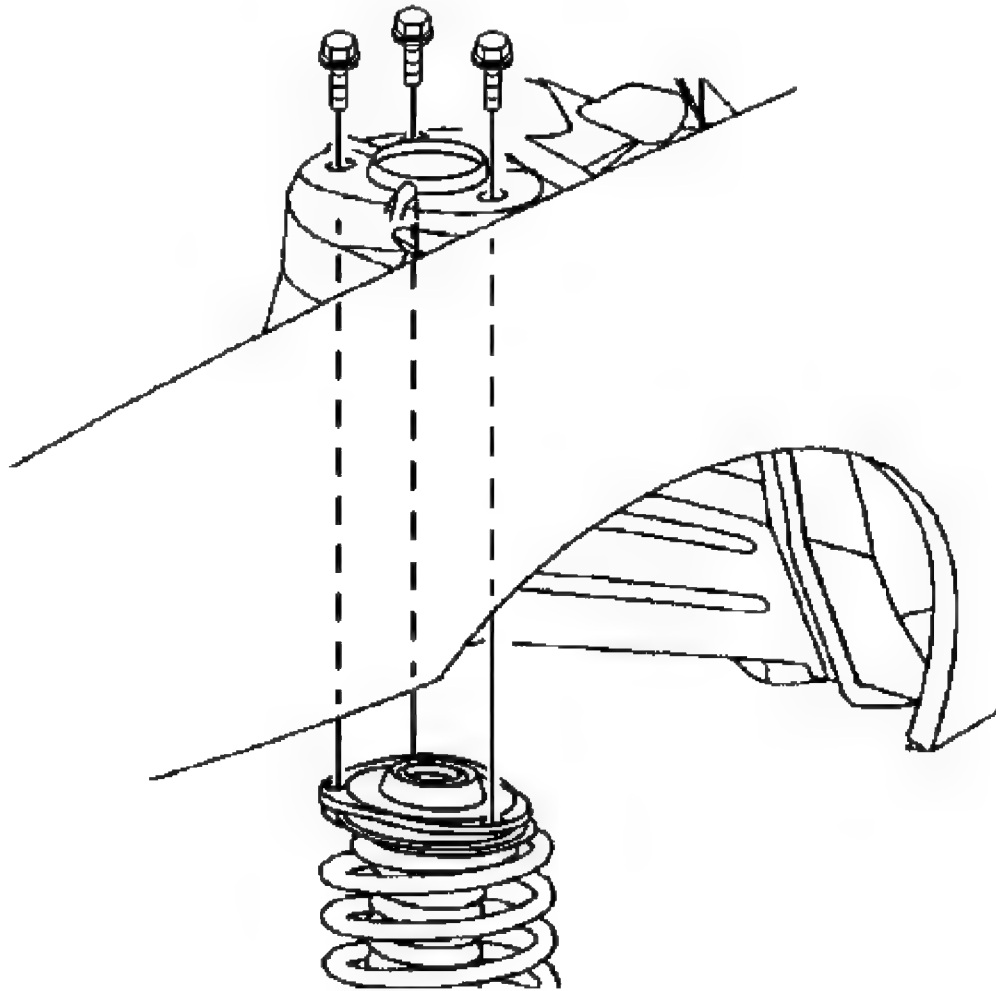


Fig. 23: Installing Strut To Vehicle
Courtesy of GENERAL MOTORS CORP.

1. Lower the vehicle.
2. Install the strut to the vehicle.

NOTE: Refer to Fastener Notice .

3. Install the strut mount to body retaining bolts.

Tighten: Tighten the strut mount to body bolts to 60 N.m (44 lb ft).

4. Raise the vehicle.

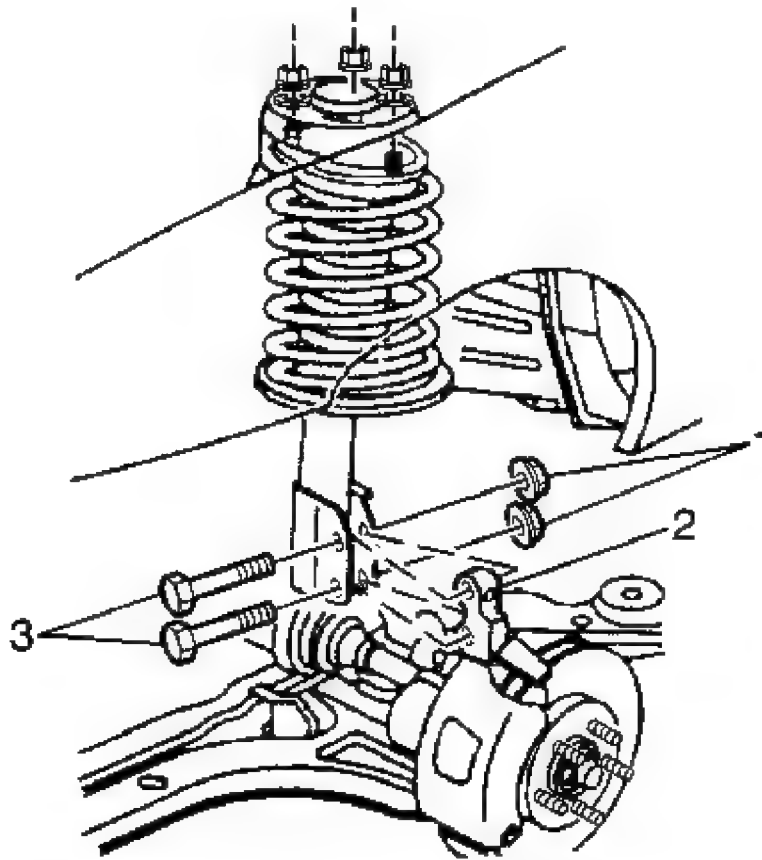


Fig. 24: Removing/Installing Strut
Courtesy of GENERAL MOTORS CORP.

5. Install the strut to steering knuckle bolts (3) and the nuts (1).

Tighten: Tighten the strut to knuckle nuts to 177 N.m (131 lb ft).

6. Connect the brake line and retaining bolt to the strut.
7. If applicable, connect the speed sensor bracket and retaining bolt to the strut.

Tighten: Tighten the brake line and the speed sensor bracket bolts to 23 N.m (17 lb ft).

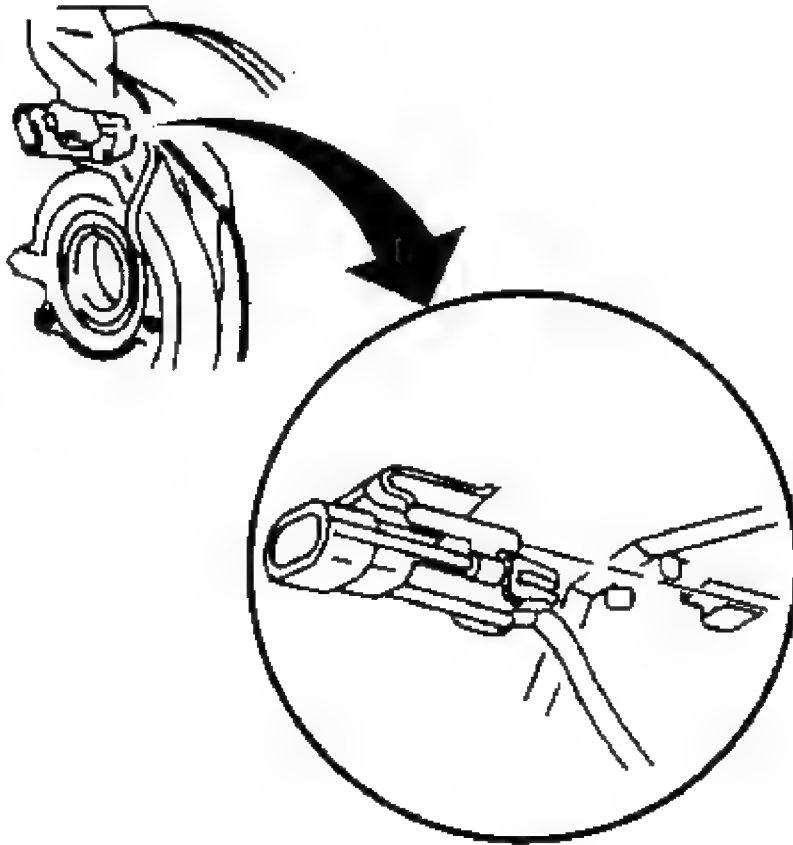


Fig. 25: Disconnecting/Reconnecting ABS Front Wheel Speed Sensor
Courtesy of GENERAL MOTORS CORP.

8. Connect the ABS front wheel speed sensor harness connector.
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. Lower the vehicle.
11. Perform a front wheel alignment. Refer to **Wheel Alignment Measurement** .

SUSPENSION SHOCK/STRUT DISPOSAL

CAUTION: Use the proper eye protection when drilling to prevent metal chips from causing physical injury.

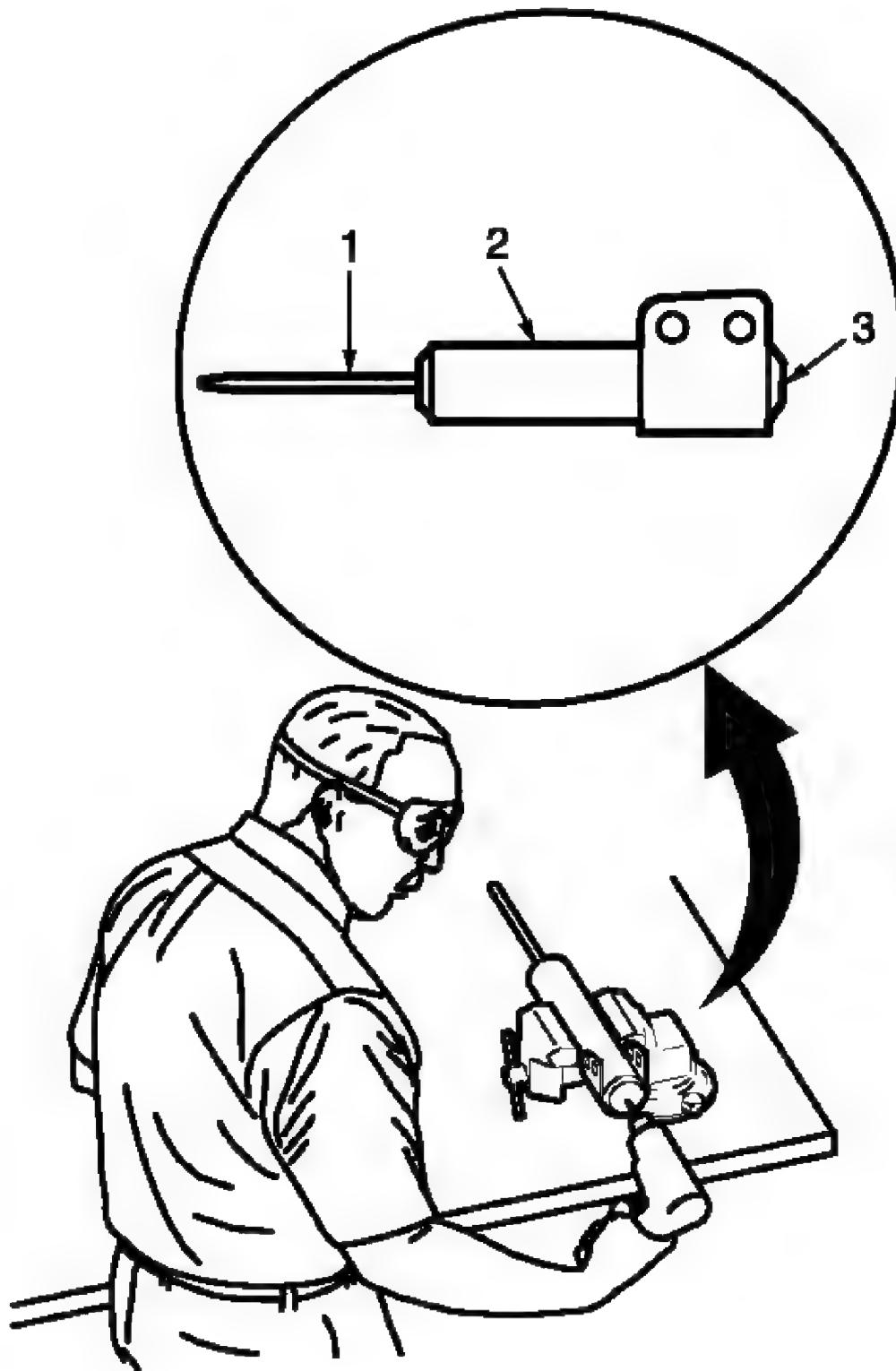


Fig. 26: Drilling Hole In Strut At Center Of End Cap

Courtesy of GENERAL MOTORS CORP.

1. Clamp the strut in a vise horizontally with the rod (1) completely extended.
2. Drill a hole in the strut at the center of the end cap (3) using a 5 mm (3/16 in) drill bit. Gas or a gas/oil mixture will exhaust when the drill bit penetrates the strut. Use shop towels in order to contain the escaping oil.
3. Remove the strut from the vise.
4. Hold the strut over a drain pan vertically with the hole down.
5. Move the rod (1) in and out of the tube (2) to completely drain the oil from the strut.

STRUT, STRUT COMPONENT AND SPRING REPLACEMENT**Tools Required**

- **J-35669** Strut Rod Nut Socket. See Special Tools.
- **J 45400** Strut Spring Compressor. See Special Tools.

Disassembly Procedure

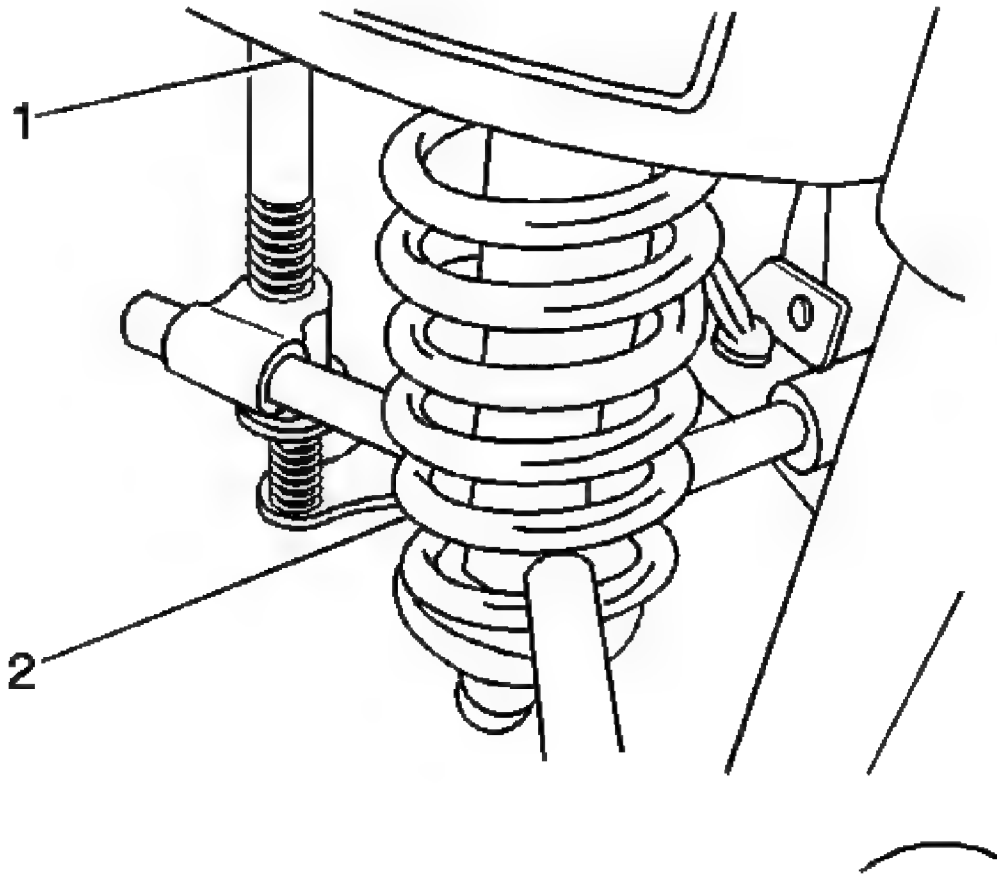


Fig. 27: Compressing/Releasing Lower Part Of Shock Spring
Courtesy of GENERAL MOTORS CORP.

1. Remove the strut from the vehicle. Refer to **Strut Assembly Replacement**.
2. Install the strut (2) in the **J 45400** (1). See **Special Tools**.

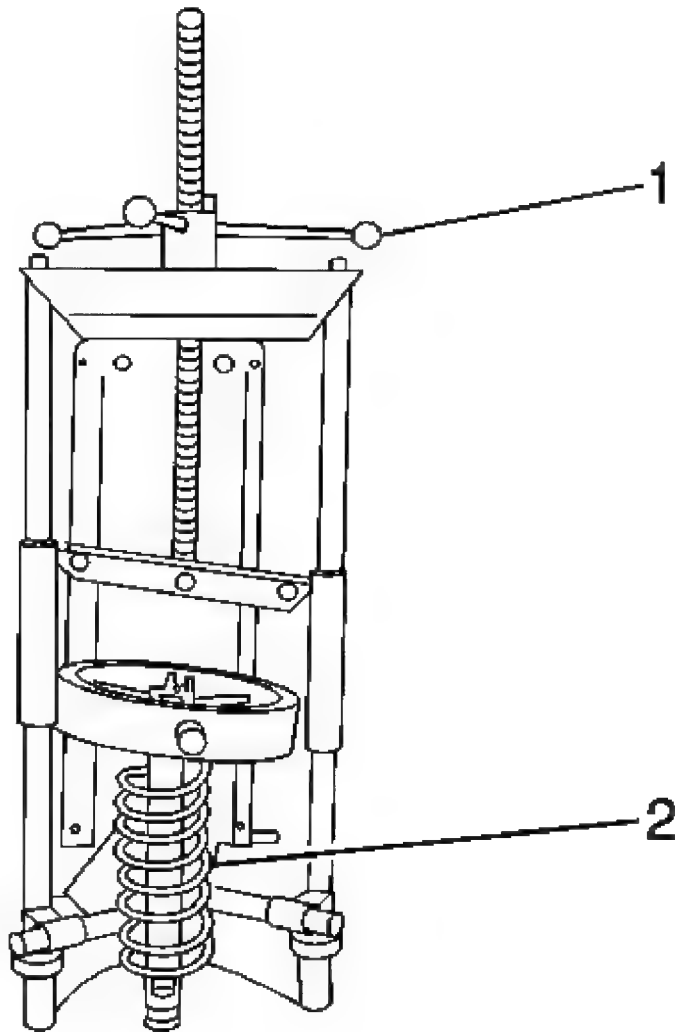


Fig. 28: View Of Compressor Forcing Screw & Coil Spring
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The spring is compressed when the strut moves freely.

3. Turn the spring compressor forcing screw (1) until the coil spring (2) is compressed.

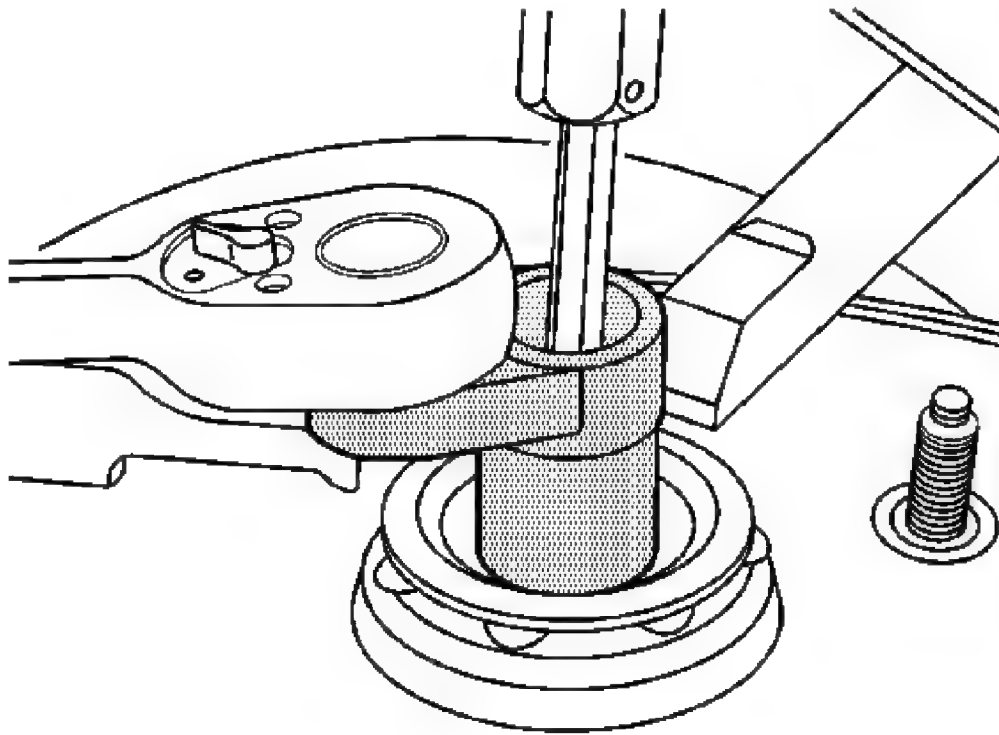


Fig. 29: Removing/Installing Strut Retaining Nut
Courtesy of GENERAL MOTORS CORP.

4. Use a 45 TORX® socket to hold the strut shaft. Use the **J-35669** to remove the upper strut mount nut. See **Special Tools**.
5. Remove the strut from the **J 45400** . See **Special Tools**.

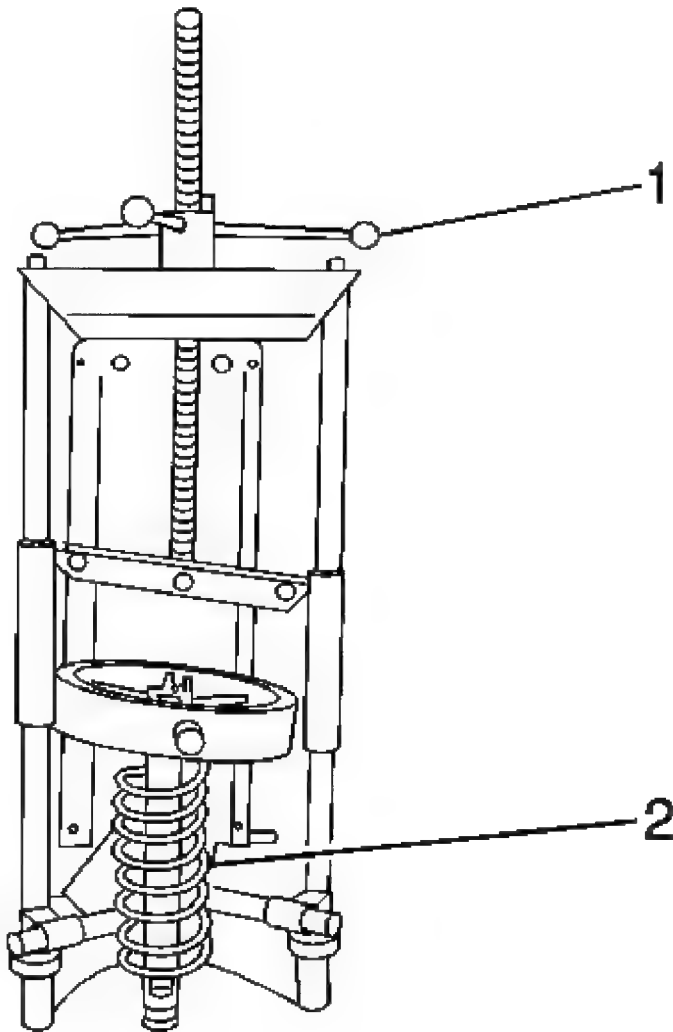


Fig. 30: View Of Compressor Forcing Screw & Coil Spring
Courtesy of GENERAL MOTORS CORP.

6. Loosen the compressor forcing screw (1) until the upper strut mount and coil spring (2) may be removed.
7. Remove the upper strut mount and the coil spring from the **J 45400** . See **Special Tools**.

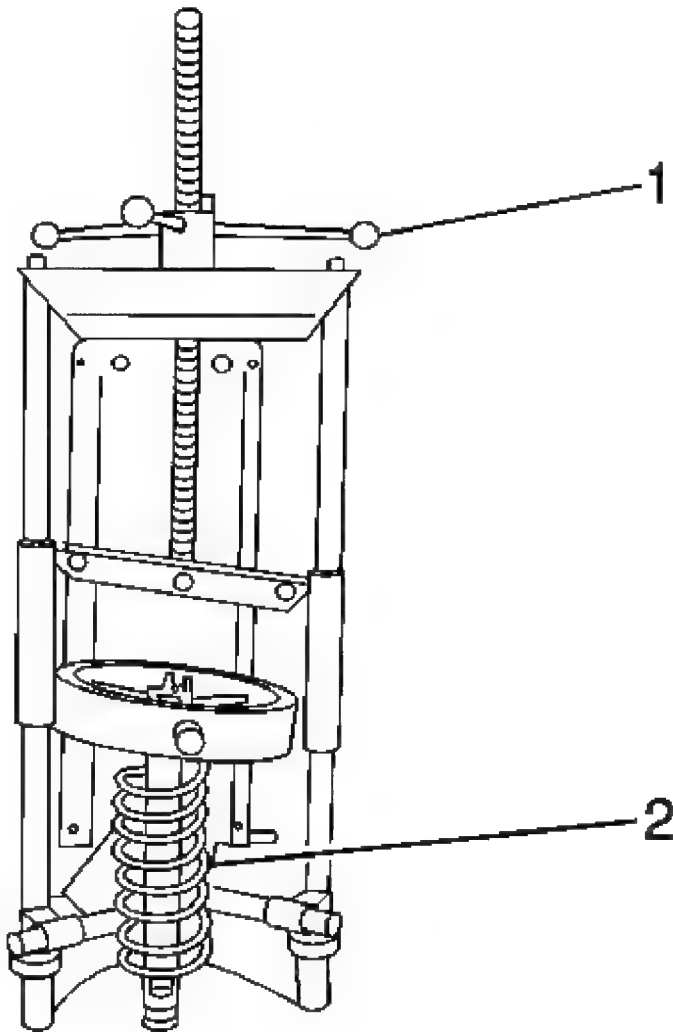


Fig. 31: View Of Compressor Forcing Screw & Coil Spring
Courtesy of GENERAL MOTORS CORP.

1. Install the coil spring and upper strut mount to the **J 45400** . See **Special Tools**.
2. Turn the spring compressor forcing screw (1) until the coil spring is compressed.
3. Install the strut to the coil spring and upper strut mount.

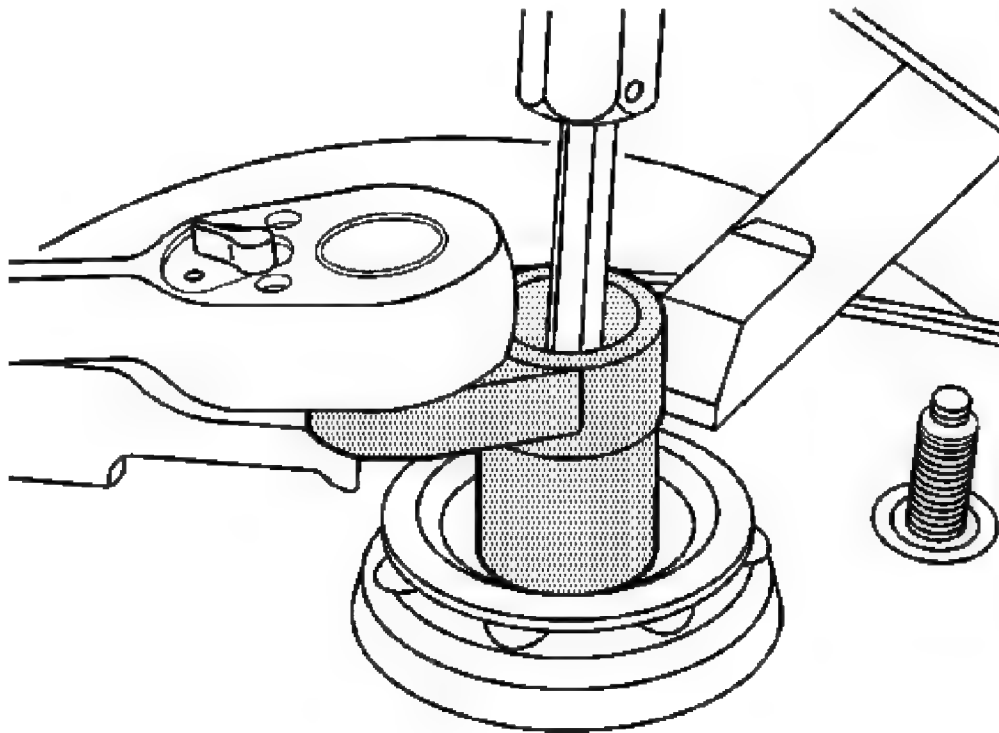


Fig. 32: Removing/Installing Strut Retaining Nut
Courtesy of GENERAL MOTORS CORP.

4. Loosely install the strut retaining nut.

NOTE: Refer to Fastener Notice .

5. Use a 45 TORX® socket to hold the strut shaft. Use the **J-35669** to install the upper strut mount nut. See Special Tools.

Tighten: Tighten the strut mount nut to 75 N.m (55 lb ft).

6. Remove the strut from the **J 45400** . See Special Tools.
7. Install the strut to the vehicle. Refer to Strut Assembly Replacement.

DESCRIPTION AND OPERATION

FRONT SUSPENSION DESCRIPTION AND OPERATION

The front suspension has 2 primary purposes:

- Isolate the driver from irregularities in the road surface.
- Define the ride and handling characteristics of the vehicle.

The front suspension absorbs the impact of the tires travelling over irregular road surfaces and dissipates this energy throughout the suspension system. This process isolates the vehicle occupants from the road surface. The rate at which the suspension dissipates the energy and the amount of energy that is absorbed is how the suspension defines the vehicles ride characteristics. Ride characteristics are designed into the suspension system and are not adjustable. The ride characteristics are mentioned in this description in order to aid in the understanding of the functions of the suspension system. The suspension system must allow for the vertical movement of the tire and wheel assembly as the vehicle travels over irregular road surfaces while maintaining the tire's horizontal relationship to the road.

This requires that the steering knuckle be suspended between a lower control arm and a strut assembly. The lower control arm attaches from the steering knuckle at the outermost point of the control arm. The attachment is through a ball and socket type joint. The innermost end of the control arm attached at 2 points to the vehicle frame through semi-rigid bushings. The upper portion of the steering knuckle is attached to a strut assembly. The strut assembly then connects to the vehicle body by way of an upper bearing. The steering knuckle is allowed to travel up and down independent of the vehicle body structure and frame.

This up and down motion of the steering knuckle as the vehicle travels over bumps is absorbed predominantly by the coil spring. This spring is retained under tension over the strut assembly. A strut is used in conjunction with this system in order to dampen out the oscillations of the coil spring. A strut is a basic hydraulic cylinder. The strut is filled with oil and has a moveable shaft that connects to a piston inside the strut. Valves inside the shock absorber offer resistance to oil flow and consequently inhibit rapid movement of the piston and shaft. Each end of the shock absorber is connected in such a fashion to utilize this recoil action of a spring alone. Each end of the strut is designed as the connection point of the suspension system to the vehicle and acts as the coil spring seat. This allows the strut to utilize the dampening action to reduce the recoil of a spring alone. The lower control arm is allowed to pivot at the vehicle frame in a vertical fashion. The ball joint allows the steering knuckle to maintain the perpendicular relationship to the road surface.

Front suspensions systems utilize a stabilizer shaft. The stabilizer bar connects between the left and right lower control arm assemblies through the stabilizer link and stabilizer shaft insulators. This bar controls the amount of independent movement of the suspension when the vehicle turns. Limiting the independent movement defines the vehicles handling characteristics on turns.

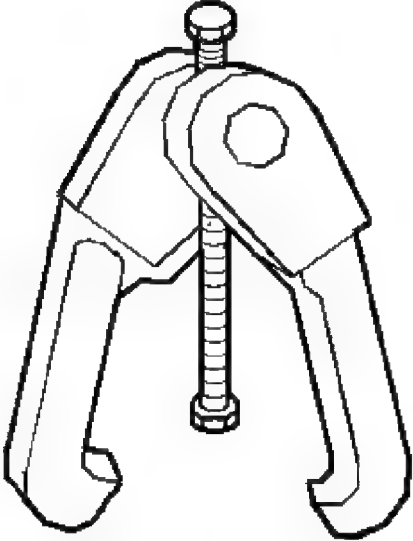
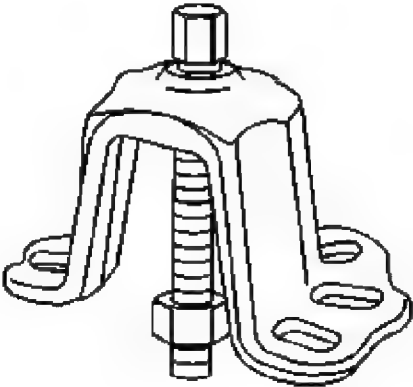
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

2006 Buick Lucerne CXS

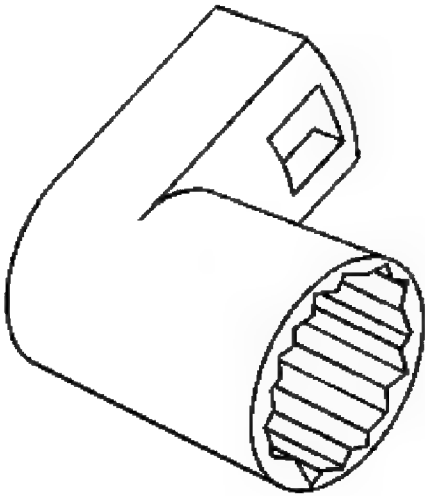
2006 SUSPENSION Front Suspension - Lucerne

Special Tools

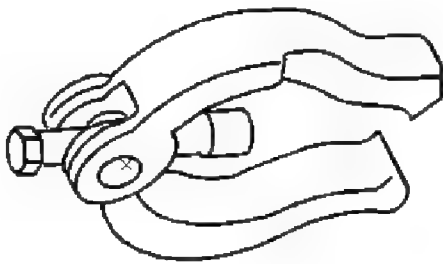
Illustration	Tool Number/Description
	<p>J 24319-B Steering Linkage and Tie Rod Puller</p>
	<p>J 28733-B Front Hub Spindle Remover</p>

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J 35669
Strut Rod Nut Socket

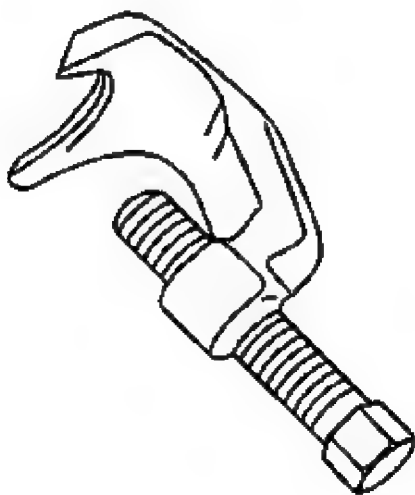


J 39549
Ball Joint and Tie Rod Separator

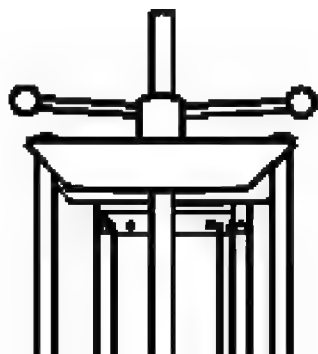
J 43631
Ball Joint Remover

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J 45400
Strut Spring Compressor



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